



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL MARINE FISHERIES SERVICE  
Northwest Region  
7600 Sand Point Way N.E., Bldg. 1  
Seattle, WA 98115

Refer to:  
OSB2000-0076

June 22, 2000

Lawrence C. Evans  
Chief, Regulatory Branch  
Corps of Engineers, Portland District  
ATTN: Dave Kurkoski  
P.O. Box 2946  
Portland, Oregon 97232

Re: Biological Opinion on Corps of Engineers' Issuance of a Regional General Permit for Stream Restoration Activities in Oregon Involving Large Wood and Boulder Placement

Dear Mr. Evans:

Enclosed is the National Marine Fisheries Service's (NMFS) biological opinion (Opinion) on the issuance of a Regional General Permit for stream restoration activities in Oregon involving the placement of large wood and boulders as described in the U.S. Army Corps of Engineer's (COE) Biological Assessment (BA) dated April 7, 2000 and additional information supplied on April 17, 2000. This Opinion addresses Snake River sockeye salmon (*Oncorhynchus nerka*), Snake River spring/summer chinook salmon (*O. tshawytscha*), Snake River fall chinook salmon (*O. tshawytscha*), Lower Columbia River steelhead (*O. mykiss*), Upper Columbia River steelhead (*O. mykiss*), Snake River steelhead (*O. mykiss*), Upper Willamette River steelhead (*O. mykiss*), Middle Columbia River steelhead (*O. mykiss*), Columbia River chum salmon (*O. keta*), Lower Columbia River chinook salmon (*O. tshawytscha*), Upper Willamette River chinook salmon (*O. tshawytscha*), Upper Columbia River spring run chinook salmon (*O. tshawytscha*), Southern Oregon/Northern California coast coho salmon (*O. kisutch*), and Oregon coast coho salmon (*O. kisutch*). This Opinion constitutes formal consultation for those listed species.

The NMFS has determined that the proposed action is not likely to jeopardize the continued existence of the listed species described above or adversely modify designated critical habitat. An Incidental Take Statement provides non-discretionary terms and conditions to minimize the potential for incidental take of listed species.

This Opinion also contains NMFS' proposed Essential Fish Habitat (EFH) conservation recommendations for chinook salmon (*O. tshawytscha*) and coho salmon (*O. kisutch*) as required by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) as amended (16 U.S.C. 1801 et seq.). While EFH designations for salmon have yet to be approved by the Secretary of Commerce, we expect such approval to be forthcoming and therefore provide these recommendations to facilitate your consultation obligations. Once the EFH designations are



approved, the COE has a statutory requirement under section 305(b)(4)(B) of the MSFCMA to describe in writing those measures proposed for avoiding, mitigating, or offsetting the impact of the activity on EFH within 30 days.

If you have any questions regarding this Opinion, please contact Michael Tehan of my staff in the Oregon State Branch Office at (503) 231-2224.

Sincerely,

A handwritten signature in black ink, reading "William M. Stelle, Jr.", with a stylized flourish at the end.

William Stelle, Jr.  
Regional Administrator

Enclosure

Endangered Species Act - Section 7  
Consultation

Programmatic Biological Opinion

Proposed Regional General Permit  
for  
Stream Restoration

Agency: Army Corps of Engineers, Portland District

Consultation Conducted By: National Marine Fisheries Service,  
Northwest Region

Date Issued: June 22, 2000

Refer to: OSB2000-0076

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## I. BACKGROUND

On April 7, 2000, the National Marine Fisheries Service (NMFS) received a request from the U.S. Army Corps of Engineers, Portland District (COE) for Endangered Species Act (ESA) section 7 formal consultation for programmatic coverage for a proposed Regional General Permit (RGP) for certain stream restoration activities (habitat restoration using large wood or boulders throughout the State of Oregon) requiring COE approval. The Biological Assessment (BA) provided with the request determined that the proposed activities covered under the RGP would be “likely to adversely affect” anadromous fish species listed under the ESA (Table 1). Species considered in this Biological Opinion (Opinion) are: Snake River sockeye salmon (*Oncorhynchus nerka*); Snake River spring/summer chinook salmon (*O. tshawytscha*); Snake River fall chinook salmon (*O. tshawytscha*); Lower Columbia River steelhead (*O. mykiss*); Upper Columbia River steelhead (*O. mykiss*); Snake River steelhead (*O. mykiss*); Upper Willamette River steelhead (*O. mykiss*); Middle Columbia River steelhead (*O. mykiss*); Columbia River chum salmon (*O. keta*); Lower Columbia River chinook salmon (*O. tshawytscha*); Upper Willamette River chinook salmon (*O. tshawytscha*); Upper Columbia River spring run chinook salmon (*O. tshawytscha*); S. Oregon/N. California Coast coho salmon (*O. kisutch*); and Oregon Coast coho salmon (*O. kisutch*). On April 18, 2000, NMFS received a letter from COE providing additional information on proposed criteria to be included in the RGP. On May 12, 2000, NMFS received an e-mail with further proposed criteria to be included in the RGP.

The intent of the programmatic consultation is to develop standard criteria and procedures to allow for expeditious approval of instream restoration activities that are designed to benefit listed species.

The objective of this Opinion is to determine whether the issuance of the proposed Regional General Permit for certain stream restoration activities permitted by the COE throughout the State of Oregon is likely to jeopardize the continued existence of listed, or proposed, salmonids, or destroy, or adversely modify designated critical habitat.

## II. PROPOSED ACTION

The proposed action involves the issuance of a Regional General Permit (RGP) for fish habitat enhancement projects throughout the State of Oregon involving the placement of large wood or boulders in streams. The placement of large wood would be limited to stream channels where large wood should naturally occur but is currently lacking. Placement of large wood should occur in channels with an intact, well-vegetated riparian area which is not mature enough to provide large wood, or in conjunction with riparian restoration and/or management. Wood placement would also be limited to areas where the absence of large wood has been identified as a limiting factor for fish habitat using survey data. Restoration projects will meet wood diameter, stream size and slope requirements as adapted from A Guide to Placing Large Wood in Streams, Oregon Department of Forestry and Oregon Department of Fish and Wildlife (May 1995) and the guidance regarding large wood

placement contained in Oregon Aquatic Habitat Restoration and Enhancement Guide (1999). Large wood pieces could not be permanently anchored, but biodegradable manila/sisal rope could be used for temporary stabilization.

The proposed RGP will authorize projects only where no wood is used from within the bankfull area or within 20 feet from the bankfull area, except when such wood results from trees that are felled, moved, or harvested as allowed by Oregon forest practice rules for road construction, cable yarding corridors, or temporary stream crossings. The proposed RGP would exclude projects which include use of the basal area credit described in Oregon Forest Practices Rules (Oregon Administrative Rules 629-640-110).

The placement of large boulders would be restricted to streams where boulders would naturally occur and are currently lacking. Boulder placement projects must rely on the size of boulder for stability, not on any artificial cabling or other devices. Total length of a placement project will be limited to 250 feet. The proposed RGP would authorize projects which place boulders in random patterns replicating natural conditions without substantially modifying stream hydraulics. It would not authorize the use of boulders to construct weirs, barbs, streambank stabilization, dams or other structures. No boulders would be allowed to be placed in streams with a slope greater than 10%.

Permanently-anchored structures, engineered structures and deflectors, debris jam structures relying on large rock, rebar and cable, and other similar habitat construction projects would not be authorized under this RGP.

In-water work, including temporary fills or structures, will occur within the time periods recommended by Oregon Department of Fish and Wildlife in the most current version of Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources. Discharges in salmonid spawning areas during spawning seasons are not allowed under this permit. Protection from disturbance, to the maximum extent possible, of riparian, wetland, and shoreline vegetation in the project area will be required. Disturbed areas will be required to be restored and enhanced when unavoidably disturbed due to activities associated with the authorized work. Damaged or destroyed vegetation will be required to be replaced with native plant materials. The operation of heavy equipment in the streambed would be prohibited except: 1) Where it is necessary to cross streams to avoid springs or to minimize disturbance of riparian vegetation; 2) the streambed consists of bedrock, no compaction will occur in the streambed, and only minimal compaction in the floodplain; 3) there is no surface flow in the channel; or 4) equipment cannot safely reach the channel work site due to steep and/or rugged terrain.

Actions which meet the terms and conditions of the general permit could proceed without prior notification to the COE District Engineer. Post-construction reporting within 30 days of completion to the Oregon Watershed Enhancement Board would be required. The report would include: 1) A description of the number, size and source of large wood pieces and/or boulders placed instream; 2) the method of placement; 3) a plan view drawing showing placement of the large wood and/or boulders

relative to the streambank, bankfull width, slope, average depth, and a representative stream cross-section drawing and a longitudinal profile diagram for the length of the boulder placement section in those streams with slopes greater than 3% and less than 10%; 4) the name and location of the stream; 5) the location of the project (using latitude and longitude coordinates) and 6) the dates on which the work occurred. The inclusion of photographs of the completed work, although not required, is encouraged. The Oregon Watershed Enhancement Board would provide a report to the COE summarizing these activities no later than November 1. These actions would also not require any further ESA consultation.

The proposed permit would be issued for an initial period of one year, with the option to extend the expiration date up to five years from the initial effective date. Before a decision is made to extend the proposed permit, the COE is expected to request reinitiation of this formal consultation.

### **III. BIOLOGICAL INFORMATION AND CRITICAL HABITAT**

The action area is defined by NMFS regulations (50 CFR 402) as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” The action area for this consultation is the State of Oregon, specifically any streams that may contain any of the 14 listed species of anadromous salmonids. Essential habitat features for salmonids are: (1) Substrate; (2) water quality; (3) water quantity; (4) water temperature; (5) water velocity; (6) cover/shelter; (7) food (juvenile only); (8) riparian vegetation; (9) space; and (10) safe passage conditions (50 CFR 226). The proposed action may affect all of these essential habitat features

References for additional background on listing status, biological information and critical habitat elements are provided in Table 1.

### **IV. EVALUATING PROPOSED ACTIONS**

The standards for determining jeopardy are set forth in Section 7(a)(2) of the ESA as defined by 50 CFR 402 (the consultation regulations). NMFS must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify critical habitat. This analysis involves the initial steps of: (1) Defining the biological requirements of the listed species; and (2) evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NMFS evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NMFS must consider the estimated level of mortality attributable to: (1) Collective effects of the proposed or continuing action; (2) the environmental baseline; and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific

to the listed species' life stages that occur beyond the action area. If NMFS

Table 1. References for additional background on listing status, biological information, and critical habitat elements for the listed and proposed species addressed in this biological opinion.

Species	Listing Status	Critical habitat	Biological Information, Population Trends
Snake River sockeye salmon	November 20, 1991, 56 FR 58619	December 28, 1993, 58 FR 68543	Waples <i>et al.</i> 1991a; Burgner 1991; ODFW and WDFW 1998
Southern Oregon/Northern California coho salmon	June 18, 1997, 62 FR 33038	May 5, 1999 64 FR 24049	Weitkamp <i>et al.</i> 1995; NMFS 1997a; Sandercock 1991; Nickelson <i>et al.</i> 1992
Oregon Coast coho salmon	August 10, 1998, 63 FR 42587	February 16, 2000 65 FR 7764	Weitkamp <i>et al.</i> 1995; Nickelson <i>et al.</i> 1992; NMFS 1997b; Sandercock 1991
Upper Columbia River steelhead	August 18, 1997, 62 FR 43937	February 16, 2000 65 FR 7764	Busby <i>et al.</i> 1995; Busby <i>et al.</i> 1996; ODFW and WDFW 1998
Snake River Basin steelhead	August 18, 1997, 62 FR 43937	February 16, 2000 65 FR 7764	Busby <i>et al.</i> 1995; Busby <i>et al.</i> 1996; ODFW and WDFW 1998
Lower Columbia River steelhead	March 19, 1998, 63 FR 13347	February 16, 2000 65 FR 7764	Busby <i>et al.</i> 1995; Busby <i>et al.</i> 1996; ODFW and WDFW 1998
Upper Willamette River steelhead	March 25, 1999, 64 FR 14517	February 16, 2000 65 FR 7764	Busby <i>et al.</i> 1995; Busby <i>et al.</i> 1996; ODFW and WDFW 1998
Middle Columbia River steelhead	March 25, 1999, 64 FR 14517	February 16, 2000 65 FR 7764	Busby <i>et al.</i> 1995; Busby <i>et al.</i> 1996; ODFW and WDFW 1998
Columbia River chum salmon	March 25, 1999, 64 FR 14508	February 16, 2000 65 FR 7764	Johnson <i>et al.</i> 1997; Salo 1991; ODFW and WDFW 1998
Snake River fall chinook salmon	April 22, 1992, 57 FR 14653	December 28, 1993, 58 FR 68543	Waples <i>et al.</i> 1991b; Healey 1991; ODFW and WDFW 1998
Lower Columbia River chinook salmon	March 24, 1999, 64 FR 14308	February 16, 2000 65 FR 7764	Myers <i>et al.</i> 1998; Healey 1991; ODFW and WDFW 1998
Snake River spring/summer chinook salmon	April 22, 1992, 57 FR 14653	December 28, 1993, 58 FR 68543 and October 25, 1999, 64 FR 57399	Matthews and Waples 1991; Healey 1991; ODFW and WDFW 1998
Upper Willamette River chinook salmon	March 24, 1999, 64 FR 14308	February 16, 2000 65 FR 7764	Myers <i>et al.</i> 1998; Healey 1991; ODFW and WDFW 1998
Upper Columbia River spring run chinook salmon	March 24, 1999, 64 FR 14308	February 16, 2000 65 FR 7764	Myers <i>et al.</i> 1998; Healey 1991; ODFW and WDFW 1998



finds that the action is likely to jeopardize, NMFS must identify reasonable and prudent alternatives for the action.

NMFS also evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' critical habitat. The NMFS must determine whether habitat modifications appreciably diminish the value of critical habitat for both survival and recovery of the listed species. The NMFS identifies those effects of the action that impair the function of any essential feature of critical habitat. The NMFS then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NMFS concludes that the action will adversely modify critical habitat, it must identify any reasonable and prudent alternatives available.

For the proposed action, NMFS' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NMFS' critical habitat analysis considers the extent to which the proposed action impairs the function of essential elements necessary for migration, spawning, and rearing of the listed species under the existing environmental baseline.

## **A. Biological Requirements**

The first step in the methods NMFS uses for applying the ESA section 7(a)(2) to listed salmon is to define the species' biological requirements that are most relevant to each consultation. NMFS also considers the current status of the listed species taking into account population size, trends, distribution and genetic diversity. To assess the current status of the listed species, NMFS starts with the determinations made in its decision to list the species for ESA protection and also considers new data available that is relevant to the determination.

The relevant biological requirements are those necessary for salmonids to survive and recover to naturally reproducing population levels at which protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance its capacity to adapt to various environmental conditions, and allow it to become self-sustaining in the natural environment.

For this consultation, the biological requirements are improved habitat characteristics that function to support successful migration, spawning and rearing habitat and over-wintering refugia. Salmon survival in the wild depends upon the proper functioning of certain ecosystem processes, including habitat formation and maintenance. Restoring functional habitats depends largely on allowing natural processes to increase their ecological function, while at the same time removing adverse impacts of current practices. In conducting analyses of habitat-altering actions, NMFS usually defines the biological requirements in terms of a concept called Properly Functioning Condition and utilizes a "habitat approach" to its analysis (Attachment 1). The current status of listed salmonids in the state of Oregon, based upon their risk of extinction, has not significantly improved since the species were listed. The NMFS is not aware of any new data that would indicate otherwise.

## **B. Environmental Baseline**

The biological requirements of listed salmonids in the State of Oregon are currently not being met under the environmental baseline. Their status is such that there must be a significant improvement in the environmental conditions they experience over those currently available under the environmental baseline. Any further degradation of these conditions would have a significant impact due to the amount of risk they presently face under the environmental baseline.

The action area is the area that is directly and indirectly affected by the proposed action. The direct effects occur at the project site and may extend upstream or downstream, based on the potential for impairing fish passage, hydraulics, sediment and pollutant discharge, and the extent of riparian habitat modifications. Indirect effects may occur throughout the watershed where actions described in this Opinion lead to additional activities or affect ecological functions contributing to stream degradation. The action area for this consultation is the range of the 14 listed species in the State of Oregon.

## **V. ANALYSIS OF EFFECTS**

### **A. Effects of Proposed Actions**

Placement of large woody debris (LWD) into streams can result in the creation of pools that may influence the distribution and abundance of juvenile salmonids (Beechie and Sibley 1997; Spalding *et al.* 1995). Bilby and Ward (1989) state that LWD influences the physical form of the channel, retention of organic matter and biological community composition. Cederholm *et al.* (1997) indicate that in small (<10 m bankfull width) and intermediate (10-20 m bankfull width) streams, LWD contributes channel stabilization, energy dissipation and sediment storage and that low gradient, large (>5<sup>th</sup> order) streams do not normally have LWD mid-stream. The presence and abundance of LWD are correlated with growth, abundance and survival of juvenile salmonids (Spalding *et al.* 1995; Fausch and Northcote 1992). Carlson *et al.* (1990) found that pool volume was inversely related to stream gradient with a direct relation to the amount of LWD. Fausch and Northcote (1992) indicate that size of LWD is important for habitat creation. Hicks *et al.* (1991) indicate that lack of LWD available for recruitment from the riparian zone also leads to reduction in the quality of fish habitat. LWD has a substantial influence on intermediate streams (10-30 m bankfull width, <4% gradient), but is less important in small (<10 m bankfull width, >4% gradient) and large (>30 m bankfull width, <2% gradient) streams (Hogan and Ward 1997). Kauffman *et al.* (1997) indicate that length of LWD is critical in retaining the piece in the sited area, with pieces longer than the active channel width less likely to move during high flows.

Boulder placement is a common method used to create rearing habitat (Reeves *et al.* 1991) and can provide suitable habitat for salmonids (Ward 1997). Ward (1997) indicates that clusters of spaced boulders placed at the lower end of riffle habitats that complement the natural stream curvature are well utilized by fish and durable to flows. Koning and Keeley (1997) state that

*“Boulder clusters provide rearing habitat for juvenile salmonids.”* Although placement has been successful in salmonid habitat creation, potential problems should not be overlooked and hydrologist and geomorphologists should help plan projects to ensure their success (Reeves *et al.* 1991).

Although improving habitat within streams is an important tool for restoring populations of salmonids, these projects have the potential to have both short- and long-term impacts to salmonids.

In the short term, in-water work associated with restoration activities could result in the disturbance of salmonids through turbidity, noise, contact (or near-contact) with equipment, compaction and disturbance of in-stream gravel from heavy equipment, and modification to adjacent riparian areas. Juvenile fish that may be rearing in the vicinity of the action area would most likely be displaced, although working during the in-water work period may lessen or preclude fish presence.

Suspended sediment and turbidity influences on fish reported in the literature range from beneficial to detrimental. Elevated Total Suspended Solids (TSS) conditions have been reported to enhance cover conditions, reduce piscivorous fish/bird predation rates, and improve survival. Elevated TSS conditions have also been reported to cause physiological stress, reduce growth, and adversely affect survival. Of key importance in considering the detrimental effects of TSS on fish are the frequency and the duration of the exposure (not just the TSS concentration).

Behavioral avoidance of turbid waters may be one of the most important effects of suspended sediments (DeVore *et al.* 1980, Birtwell *et al.* 1984, Scannell 1988). Salmonids have been observed to move laterally and downstream to avoid turbid plumes (McLeay *et al.* 1984, 1987, Sigler *et al.* 1984, Lloyd 1987, Scannell 1988, Servizi and Martens 1992). Juvenile salmonids tend to avoid streams that are chronically turbid, such as glacial streams or those disturbed by human activities, except when the fish need to traverse these streams along migration routes (Lloyd *et al.* 1987). In addition, a potentially positive reported effect is providing refuge and cover from predation (Gregory and Levings 1988). Turbidity, at moderate levels, has the potential to adversely affect primary and secondary productivity, and at high levels, has the potential to injure and kill adult and juvenile fish, and may also interfere with feeding (Spence *et al.* 1996). Newly emerged salmonid fry may be vulnerable to even moderate amounts of turbidity (Bjornn and Reiser 1991). Other behavioral effects on fish, such as gill flaring and feeding changes, have been observed in response to pulses of suspended sediment (Berg and Northcote 1985). Fine redeposited sediments also have the potential to adversely affect primary and secondary productivity (Spence *et al.* 1996), and to reduce incubation success (Bell 1991) and cover for juvenile salmonids (Bjornn and Reiser 1991). There is a low probability of direct mortality, because the turbidity should be localized and brief, and because the fish should be aware and agile enough to avoid any equipment used to place logs and boulders.

In-stream use of heavy equipment may compact and disturb stream bed gravels. Compaction and disturbance of stream bed gravels may increase difficulty in redd excavation and the ability of the gravels to be aerated, resulting in lost productivity. Cederholm *et al.* (1997) recommend that heavy equipment work should be performed from the bank and that work within bedrock or boulder/cobble

bedded channels should be viewed as a last resort and that least impacting equipment such as spider harvesters/log loaders be utilized. Helicopter placement of LWD and boulders may be a viable alternative in some circumstances (Cederholm *et al.* 1997, Slaney and Martin 1997).

Short-term alterations to the adjacent riparian area to facilitate access to the stream may result in increases in turbidity and loss of vegetation. The loss of vegetation may result in some small amount of increased solar radiation and subsequent small increase in stream temperature.

The removal of trees within 20' of the waters edge to supply woody debris could also have these effects. The proposed RGP would only allow for the placement of woody debris in areas that are well-vegetated, but immature and unable to supply the woody debris naturally. The cutting of trees within 20' could substantially extend the amount of time necessary for the area to recover and function normally.

In the long term, there is the potential to have a deleterious effect on a stream system if the project is not well planned, designed and implemented properly. Projects that are not well planned may fail with subsequent impacts to stream channels and banks. Cederholm *et al.* (1997) state that although there have been hundreds to thousands of restoration projects undertaken in the Pacific Northwest, their effectiveness is not well documented. Slaney and Martin (1997) state that "project evaluation is essential to improve our effectiveness." Restoration projects are often focused on the enhancement of instream habitat without adequate attention to restoring the processes that led to the loss of the habitat (Roper *et al.* 1997). House (1996) recommends that limiting factors be identified and watershed plans be completed before undertaking restoration projects. Reeves *et al.* (1991) indicate that stream hydraulics, hydrology and geomorphology are important and must be carefully evaluated before any instream work is started, and that care must be taken to identify aspects of habitat that limit production. Roper *et al.* (1997) recommend that professionals from numerous disciplines such as range ecology, silviculture, ecology, engineering and geology be part of the planning process for restoration projects. Carlson *et al.* (1990) also stressed the importance of considering all aspects of a watershed for its potential capacity for fish production. Kershner *et al.* (1991) state that to manage a stream as a viable place for fish, an understanding of the dynamics watershed and the resultant effects on the stream is required.

In addition, monitoring of the effectiveness of a stream rehabilitation project is important and "any habitat manipulation proposal should specify procedures for pre- and post-construction studies so resulting physical and biological changes can be evaluated" (Reeves *et al.* 1991). Roper *et al.* (1997) state that only through monitoring can specific restoration activities be evaluated as to their effect in overall watershed restoration.

## **B. Effects on Critical Habitat**

NMFS designates critical habitat based on physical and biological features that are essential to the listed species. Essential features for designated critical habitat include substrate, water quality, water quantity, water temperature, food, riparian vegetation, access, water velocity, space and safe passage.

In the short term, critical habitat may be altered as described above. In the long term, NMFS expects that the restoration projects will maintain, or improve, conditions in the watershed under current baseline conditions.

### **C. Cumulative Effects**

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." Other activities within the watershed have the potential to impact fish and habitat within the action area. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or have been) reviewed through separate section 7 consultation processes and are therefore not considered cumulative effects in this context.

NMFS is not aware of any significant changes in the current level of non-Federal activities that are reasonably certain to occur within the action area. NMFS assumes that future private and State actions will continue at similar intensities as in recent years.

## **VI. CONCLUSION**

NMFS has determined, based on the available information, that the proposed action is expected to improve habitat conditions within the action area through the habitat enhancement activity of placing large wood and boulders and aid in restoring the habitat to a "properly functioning condition".

Consequently, NMFS believes that the issuance of a Regional General Permit for the placement of large wood and boulders is not likely to jeopardize the continued existence of listed salmonids in the State of Oregon or adversely modify critical habitat. In making this determination, NMFS used the best available scientific and commercial data to apply its jeopardy analysis, when analyzing the effects of the proposed action on the biological requirements of the species relative to the environmental baseline, together with cumulative effects.

## **VII. REINITIATION OF CONSULTATION**

Consultation must be reinitiated if: The amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; new information reveals effects of the action may affect listed species in a way not previously considered; the action is modified in a way that causes an effect on listed species that was not previously considered; or, a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16). To reinitiate consultation, the COE should contact the Habitat Conservation Division (Oregon State Office) of NMFS.

## **VIII. INCIDENTAL TAKE STATEMENT**

Sections 4 (d) and 9 of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, and sheltering. Harass is defined as actions that create the likelihood of injuring listed species to such an extent as to significantly alter normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. Incidental take is take of listed species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

### **A. Amount or Extent of the Take**

The NMFS anticipates that the action covered by this Opinion has more than a negligible likelihood of resulting in incidental take of listed salmonids because of: The potential to disturb salmonids through increases in noise and turbidity; behavioral changes resulting from increased turbidity and contact (or near contact) with equipment; and potential changes in stream hydrology and hydraulics resulting in lost habitat and changes in behavior of salmonids. Effects of actions such as these are largely unquantifiable and are not expected to be measurable as long-term effects on population levels. Therefore, even though NMFS expects some low level incidental take to occur due to the actions covered by this Opinion, the best scientific and commercial data available are not sufficient to enable NMFS to estimate a specific amount of incidental take to the species itself. In instances such as these, the NMFS designates the expected level of take as "unquantifiable." Based on the information in the BA, NMFS anticipates that an unquantifiable amount of incidental take could occur as a result of the actions covered by this Opinion.

### **B. Reasonable and Prudent Measures**

The NMFS believes that the following reasonable and prudent measures are necessary and appropriate to avoid or minimize take of the 14 listed species addressed in this Opinion.

1. The COE shall ensure that measures are taken to minimize disturbance to salmonids resulting from turbidity, noise, contact with equipment, gravel compaction and disturbance, and disturbance to the riparian zone.
2. The COE shall monitor implementation of the Regional General Permit and report the results to NMFS prior to extending the program beyond one year.

### **C. Terms and Conditions**

To be exempt from the prohibitions of section 9 of the ESA, the COE must comply with the following terms and conditions which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

- 1a. Erosion control measures will be undertaken to ensure that turbidity does not exceed 10% above ambient (background) conditions.
- 1b. Project staging shall be done in a way that minimizes the actual time that machinery is operated in the stream. Instream equipment operation shall only occur within the ODFW approved work windows unless otherwise approved by NMFS.
- 1c. Equipment that is used for instream work will be cleaned prior to entering the two-year floodplain. External oil and grease will be removed, along with dirt and mud. Untreated wash and rinse water will not be discharged into streams and rivers without adequate treatment.
- 1d. The Permittee is responsible for containment and removal of any toxicants released. Spills shall be immediately reported to DEQ and ODFW.
- 1e. Access roads and associated staging areas within 150' of the two year floodplain shall be constructed so as to minimize erosion. Temporary access roads and other disturbed riparian areas shall be restored with native vegetation after construction is completed.
- 1f. Unobstructed fish passage must be provided at all times during any restoration activity.
- 2a. The COE shall prepare and submit to NMFS an annual report documenting the results of implementation monitoring of the RGP.

## **IX. ESSENTIAL FISH HABITAT**

Public Law 104-267, the Sustainable Fisheries Act of 1996, amended the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to establish new requirements for "Essential Fish Habitat" (EFH) descriptions in Federal fishery management plans and to require Federal agencies to consult with NMFS on activities that may adversely affect EFH. "Essential Fish Habitat" means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" Magnuson-Stevens Act §3. The Pacific Fisheries Management Council (PFMC) has recommended an EFH designation for the Pacific salmon fishery that would include those waters and substrate necessary to ensure the production needed to support a long-term sustainable fishery (*i.e.*,

properly functioning habitat conditions necessary for the long-term survival of the species through the full range of environmental variation).

The Magnuson-Stevens Act requires consultation for all actions that may adversely affect EFH, and it does not distinguish between actions in EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities that may have an adverse effect on EFH. Therefore, EFH consultation with NMFS is required by Federal agencies undertaking, permitting or funding activities that may adversely affect EFH, regardless of its location.

The consultation requirements of section 305(b) of the Magnuson-Stevens Act (16 U.S.C. 1855(b)) provide that:

- Federal agencies must consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH;
- NMFS shall provide conservation recommendations for any Federal or State activity that may adversely affect EFH;
- Federal agencies shall within 30 days after receiving conservation recommendations from NMFS provide a detailed response in writing to NMFS regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NMFS, the Federal agency shall explain its reasons for not following the recommendations.

### **Identification of Essential Fish Habitat**

Proposed designated salmon fishery EFH includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except above the impassable barriers identified by PFMC (PFMC 1999). Chief Joseph Dam, Dworshak Dam, and the Hells Canyon Complex (Hells Canyon, Oxbow, and Brownlee Dams) are among the listed man-made barriers that represent the upstream extent of the Pacific salmon fishery EFH. Salmon EFH excludes areas upstream of longstanding naturally impassable barriers (i.e., natural waterfalls in existence for several hundred years). In the estuarine and marine areas, proposed designated salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (370.4 km) offshore of Washington, Oregon, and California north of Point Conception (PFMC 1999).



## **Proposed Action**

The proposed action is detailed above in Part II. The proposed action involves the adoption by the COE of permit conditions for placement of large wood and boulders for restoration of aquatic habitat that would preclude the need for further individual ESA and EFH consultation.

The proposed action area encompasses all rivers and streams within Oregon. These waters are part of the proposed designated EFH for chinook (*Onchorhynchus tshawytscha*) and for coho (*Onchorhynchus kisutch*) salmon (PFMC 1999). A description and identification of EFH for salmon is found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of the impacts to these species' EFH from the above proposed COE permit activity is based on this information.

The objective of this programmatic EFH consultation is to determine whether the adoption of proposed conditions for placement of large wood and boulders permitted by the COE throughout the State of Oregon and allowing issuance of permits for those activities without further EFH consultation is likely to adversely affect EFH for the Pacific salmon fisheries.

## **Effects of the Proposed Action**

As described above in Part V. Analysis of Effects, the placement of large wood and boulders may positively influence the distribution and abundance of juvenile salmonids. However, there may be detrimental short- and long-term impacts associated with these activities. In-water work may result in increases in suspended sediments and turbidity; gravel compaction; loss of riparian vegetation; and increased bank erosion from hydrologic changes resulting from poorly designed placement of materials.

## **Conclusion**

The NMFS believes that the proposed action may adversely affect proposed designated EFH for chinook or coho salmon.

## **EFH Conservation Recommendations**

NMFS recommends that the Reasonable and Prudent Measures and the Terms and Conditions which implement them that are listed above in Part VIII. INCIDENTAL TAKE STATEMENT sections B and C above be adopted. Should these EFH conservation recommendations be adopted, potential adverse impacts to EFH would be minimized.

## **Statutory Requirements**

The Magnuson-Stevens Act and Federal regulations (50 CFR Section 600.920) to implement the EFH provisions require Federal action agencies to provide a written response to EFH Conservation Recommendations within 30 days of receipt. Because the EFH designation for the Pacific salmon fishery has yet to be approved, this regulation does not apply until such time as the Secretary of Commerce approves it, at which time the 30 day period will commence. The final response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity. If the response is inconsistent with the EFH Conservation Recommendations, an explanation of the reasons for not implementing them must be included.

## **Consultation Renewal**

The COE must reinitiate EFH consultation with NMFS if the action is substantially revised in a manner that may adversely affect EFH or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations (50 CFR Section 600.920 [k]).

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## **The Habitat Approach**

Implementation of Section 7 of the Endangered Species Act for  
Actions Affecting the Habitat of Pacific Anadromous Salmonids

Prepared by the National Marine Fisheries Service  
Northwest Region  
Habitat Conservation and Protected Resources Divisions  
26 August 1999



## **I. Purpose**

This document describes the analytic process and principles that the National Marine Fisheries Service (NMFS) Northwest Region (NWR) applies when conducting ESA § 7 consultations on actions affecting freshwater salmon<sup>1</sup> habitat.

## **II. Background**

Section 7 of the Endangered Species Act<sup>2</sup> (ESA) requires Federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of their critical habitat.<sup>3</sup> Federal agencies must consult with National Marine Fisheries Service (NMFS) regarding the effects of their actions on certain listed species.<sup>4</sup> The NMFS evaluates the effects of proposed Federal actions on listed salmon by applying the standards of § 7(a)(2) of the ESA as interpreted through joint NMFS and U.S. Fish and Wildlife Service (FWS) regulations and policies.<sup>5</sup> When NMFS issues a biological opinion, it uses the best scientific and commercial data available to determine whether a proposed Federal action is likely to (1) jeopardize the continued existence of a listed species, or (2) destroy or adversely modify the

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<sup>1</sup> For purposes of brevity and clarity, this document will use the word “salmon” to mean all those anadromous salmonid fishes occurring in, and native to, Pacific Ocean drainages of the United States – including anadromous forms of cutthroat and steelhead trouts, and not including salmonids occurring in Atlantic Ocean and Great Lakes drainages.

<sup>2</sup> 16 USC §§ 1531 *et seq.*

<sup>3</sup> 16 USC § 1536(a)(2) (1988).

<sup>4</sup> A 1974 Memorandum of Understanding between NMFS and FWS establishes that NMFS retains ESA jurisdiction over fish species that spend a majority of their lives in the marine environment, including salmon. *See* Memorandum of Understanding Between the U.S. Fish and Wildlife Service, United States Department of Interior, and the National Oceanic and Atmospheric Administration, United States Department of Commerce, Regarding Jurisdictional Responsibilities and Listing Procedures under the Endangered Species Act of 1973 (1974).

<sup>5</sup> *See* U.S. Fish and Wildlife Service and National Marine Fisheries Service., *Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act*. U.S. Government Printing Office, Washington, D.C. (1998).

designated critical habitat of a listed species.<sup>6</sup>

The Services' ESA implementing regulations define "jeopardize the continued existence of" to mean: "...to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species."<sup>7</sup> Section 7(a)(2)'s requirement that Federal agencies avoid jeopardizing the continued existence of listed species is often referred to as the "jeopardy standard."<sup>8</sup> The ESA likewise requires that Federal agencies refrain from adversely modifying designated critical habitat.<sup>9</sup> The Services' ESA implementing regulations define the term "destruction or adverse modification" of critical habitat to mean:

... a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.<sup>10</sup>

A species is listed as endangered if it is in danger of extinction throughout all or a significant portion of its range.<sup>11</sup> A species is listed as threatened if it is likely to become endangered within the foreseeable future.<sup>12</sup> Listing a species under the ESA therefore reflects a concern for a species' continued existence—the concern is immediate for endangered species and less immediate, but still real, for threatened species. The purpose of the ESA is to provide a means whereby the ecosystems upon which listed species depend may be conserved, such that the species no longer require the protections

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<sup>6</sup> 16 USC § 1536(a)(2) (1988).

<sup>7</sup> 50 CFR § 402.02 (1999).

<sup>8</sup> See M.J. Bean and M.J. Rowland, *The Evolution of National Wildlife Law. Third Edition*. Praeger Publishers, Westport, Connecticut, pp. 240, 253 & 260 (1997).

<sup>9</sup> 16 USC § 15536(a)(2) (1988).

<sup>10</sup> 50 CFR § 402.02 (1999).

<sup>11</sup> 16 USC § 1532(6) (1988).

<sup>12</sup> 16 USC § 1532(20) (1988).

of the ESA and can be delisted.<sup>13</sup> This constitutes “recovery” under the ESA.<sup>14</sup> Recovery, then, represents a state in which there are no serious concerns for the survival of the species.<sup>15</sup>

Impeding a species’ progress toward recovery exposes it to additional risk, and so reduces its likelihood of survival. Therefore, in order for an action to not “appreciably reduce” the likelihood of survival, it must not prevent or appreciably delay recovery. Salmon survival in the wild depends upon the proper functioning of certain ecosystem processes, including habitat formation and maintenance. Restoring functional habitats depends largely on allowing natural processes to increase their ecological function, while at the same time removing adverse impacts of current practices.<sup>16</sup> Along these lines, the courts have recognized that no bright line exists in the ESA regarding the concepts of survival and recovery.<sup>17</sup> Likewise, available scientific information concerning habitat processes and salmon population viability indicates no practical differences exist between the degree of function essential for long-term survival and that necessary to achieve recovery.<sup>18</sup>

### **III. Organization of Endangered Species Act § 7 Analyses**

In conducting analyses of habitat-altering actions under § 7 of the ESA, NMFS uses the following steps: (1) Consider the status and biological requirements of the affected species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species; (4) consider cumulative effects; (5) determine whether the proposed action, in light of the above factors, is likely to appreciably reduce the likelihood of species survival in the wild or adversely modify its critical habitat. If jeopardy or adverse

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<sup>13</sup> See, e.g., 16 USC § 1532(3) (1988) (defining the term “conserve”); 16 USC § 1531 (b) (1988) (stating the purpose of the ESA).

<sup>14</sup> See, e.g., 16 USC § 1533(f)(1) (1988) (describing the purpose of recovery plans).

<sup>15</sup> NMFS, *Memorandum from R.S. Waples, NMFS, to the Record* (1997).

<sup>16</sup> Stouder et al., *Pacific Salmon and Their Ecosystems: Status and Future Options*, Chapman and Hall, New York, New York (1997).

<sup>17</sup> *Idaho Department of Fish and Game v. NMFS*, 850 F.Supp. 886 (D. OR 1994) (discussing NMFS’ biological opinion concerning the Federal Columbia River Hydropower System).

<sup>18</sup> See 51 Fed. Reg. 19,926 (1982). In the preamble to the § 7 consultation regulations, the Services recognized that in some cases, no distinction between survival and recovery may exist, stating “If survival is jeopardized, recovery is also jeopardized...it is difficult to draw clear-cut distinctions” [between survival and recovery].

modification is found, NMFS must identify reasonable and prudent alternatives to the action if they exist.

The analytical framework described above is consistent with the Services' joint ESA § 7 Consultation Handbook<sup>19</sup> and builds upon the Handbook framework to better reflect the scientific and practical realities of salmon conservation and management on the West Coast. Below we describe this analytical framework in detail.

A. Describe the Affected Species' Status and Define its Biological Requirements.

1. Identify the Affected Species and Describe its Status

The first step in conducting this analysis is to identify listed species, and when known, populations of listed species, that may be affected by the proposed action. Under the ESA, a taxonomic species may be defined as a "distinct population segment."<sup>20</sup> The NMFS has established a policy that describes such "distinct population segments" as Evolutionarily Significant Units (ESUs).<sup>21</sup> An ESU is a population or group of populations that is substantially reproductively isolated from other conspecific populations and represents an important component in the evolutionary legacy of the species.<sup>22</sup> In implementing the ESA, NMFS has established ESUs as the listing unit for salmon under its jurisdiction. Therefore, for purposes of jeopardy determinations, NMFS considers whether a proposed action will jeopardize the continued existence of the affected ESU or adversely modify its critical habitat.<sup>23</sup>

When affected species and populations have been identified, NMFS considers the relative status of the listed species, as well as the status of populations in the action area. This may include parameters of abundance, distribution, and trends in both. Various sources of information exist to define species and

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<sup>19</sup> See FWS and NMFS, *supra* note 5.

<sup>20</sup> 16 USC § 1532(16) (1988).

<sup>21</sup> See 56 Fed. Reg. 58,618 (1991).

<sup>22</sup> R.S. Waples, *Definition of "Species" Under the Endangered Species Act: Application to Pacific Salmon*, National Marine Fisheries Service (1991).

<sup>23</sup> NMFS has recognized that in many cases ESUs contain a significant amount of genetic and life history diversity. Such diversity is represented by independent salmon populations that may inhabit river basins or major sub-basins within ESUs. In light of the importance of protecting the biological diversity represented by these populations, NMFS considers the effects of proposed actions on identifiable, independent salmon populations in judging whether a proposed action is likely to jeopardize the ESU as a whole.

population status. The final rule listing the species or designating its critical habitat is a good example of this type of information. Species' status reviews and factors for decline reports may also provide relevant information for this section. When completed, recovery plans and associated reports will provide a basis for determining species status in the action area.

## 2. Define the Affected Species' Biological Requirements

The listed species' biological requirements may be described in a number of different ways. For example, they can be expressed in terms of population viability using such variables as a ratio of recruits to spawners, a survival rate for a given life stage (or set of life stages), a positive population trend, or a threshold population size. Biological requirements may also be described as the habitat conditions necessary to ensure the species' continued existence (*i.e.*, functional habitats) and these can be expressed in terms of physical, chemical, and biological parameters.

The manner in which these requirements are described varies according to the nature of the action under consultation and its likely effects on the species.

However species' biological requirements are expressed—whether in terms of population variables or habitat components—it is important to remember that there is a strong causal link between the two: actions that affect habitat have the potential to affect population abundance, productivity, and diversity; these effects are particularly noticeable when populations are at low levels—as they are now in every listed ESU. The importance of this relationship is highlighted by the fact that freshwater habitat degradation is identified as a factor of decline in every salmon listing on the West Coast.<sup>24</sup>

Habitat-altering actions continue to affect salmon population viability, frequently in a negative manner.<sup>25</sup> However, it is often difficult to quantify the effects of a given habitat action in terms of its impact on biological requirements for individual salmon (whether in the action area or outside of it). Thus it follows that while it is often possible to draw an accurate picture of a species' rangewide status—and in fact doing so is a critical consideration in any jeopardy analysis—it is difficult to determine how that status may be affected by a given habitat-altering action. Given the current state of the science, usually the best that can be done is to determine the effects an action has on a given habitat component and, since there is a direct relationship between habitat condition and population viability, extrapolate to the impacts on the species as a whole. Thus, by examining the effects a given action has on the habitat portion of a species' biological requirements, NMFS has a gauge of how that action will affect the population variables that constitute the rest of a species' biological requirements and, ultimately, how

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<sup>24</sup> See, *e.g.*, 57 Fed. Reg. 14,653 (April 22, 1992) (Snake River spring/summer and fall chinook); 62 Fed. Reg. 24,588 (May 6, 1997) (Southern Oregon/Northern California coho); 63 Fed. Reg. 13,347 (March 18, 1998) (Lower Columbia River and Central Valley steelhead).

<sup>25</sup> See NMFS, *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (MPI) (1996).

the action will affect the species' current and future health.

Ideally, reliable scientific information on a species' biological requirements would exist at both the population and the ESU levels, and effects on habitat should be readily quantifiable in terms of population impacts. In the absence of such information, NMFS' analyses must rely on generally applicable scientific research that one may reasonably extrapolate to the action area and to the population(s) in question. Therefore, for actions that affect freshwater habitat, NMFS usually defines the biological requirements in terms of a concept called properly functioning condition (PFC). Properly functioning condition is the sustained presence of natural<sup>26</sup> habitat-forming processes in a watershed (e.g., riparian community succession, bedload transport, precipitation runoff pattern, channel migration) that are necessary for the long-term survival of the species through the full range of environmental variation. PFC, then, constitutes the habitat component of a species' biological requirements. The indicators of PFC vary between different landscapes based on unique physiographic and geologic features. For example, aquatic habitats on timberlands in glacial mountain valleys are controlled by natural processes operating at different scales and rates than are habitats on low-elevation coastal rivers.

In the PFC framework, baseline environmental conditions are described as "properly functioning," "at risk," or "not properly functioning." If a proposed action would be likely to impair<sup>27</sup> properly functioning habitat, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat toward PFC, it will usually be found likely to jeopardize the continued existence of the species or adversely modify its critical habitat or both, depending upon the specific considerations of the analysis. Such considerations may include for example, the species' status, the condition of the environmental baseline, the particular reasons for listing the species, any new threats that have arisen since listing, and the quality of the available information.

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<sup>26</sup> The word "natural" in this definition is not intended to imply "pristine," nor does the best available science lead us to believe that only pristine wilderness will support salmon. The best available science does lead us to believe that the level of habitat function necessary for the long-term survival of salmon (PFC) is most reliably and efficiently recovered and maintained by simply eliminating anthropogenic impairments, and does not usually require artificial restoration. See Rhodes et. al., *A Coarse Screening Process for Potential Application in ESA Consultations*. Columbia River Inter-Tribal Fish Commission, Portland, Oregon, pp. 59-61, (1994); National Research Council, *Upstream: Salmon and Society in the Pacific Northwest*. National Research Council, National Academy Press, Washington, D.C., p. 201 (1996).

<sup>27</sup> In this document, to "impair" habitat means to reduce habitat condition to the extent that it does not fully support long-term salmon survival and therefore "impaired habitat" is that which does not perform that full support function. Note that "impair" and "impaired" are not intended to signify any and all reduction in habitat condition.

Since lotic<sup>28</sup> habitats are inherently dynamic, PFC is defined by the persistence of natural processes that maintain habitat productivity at a level sufficient to ensure long-term survival. Although the indicators used to assess functioning condition may entail instantaneous measurements, they are chosen, using the best available science, to detect the health of underlying processes, not static characteristics. “Best available science” advances through time; this advance allows PFC indicators to be refined, new threats to be assessed, and species status and trends to be better understood. The PFC concept includes a recognition that natural patterns of habitat disturbance will continue to occur. For example, floods, landslides, wind damage, and wildfires will result in spatial and temporal variability in habitat characteristics, as will anthropogenic perturbations.

B. Evaluate the Relevance of the Environmental Baseline in the Action Area to the Species’ Current Status.

The environmental baseline represents the current basal set of conditions to which the effects of the proposed or continuing action would be added. It “includes the past and present impacts of all Federal, State, or private activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early § 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process.”<sup>29</sup>

The environmental baseline does not include any future discretionary Federal activities (that have not yet undergone ESA consultation) in the action area. The species’ current status is described in relation to the risks presented by the continuing effects of all previous actions and resource commitments that are not subject to further exercise of Federal discretion. For a new project, the environmental baseline consists of the conditions in the action area that exist before the proposed action begins. For an ongoing Federal action, those effects of the action resulting from past unalterable resource commitments are included in the baseline, and those effects that would be caused by the continuance of the proposed action are then analyzed for determination of effects.

The reason for determining the species’ status under the environmental baseline (without the effects of the proposed or continuing action) is to better understand the relative significance of the effects of the action upon the species’ likelihood of survival and chances for recovery. Thus if the species’ status is poor and the baseline is degraded at the time of consultation, it is more likely that any additional adverse effects caused by the proposed or continuing action will be significant.

The implementing regulations specify that the environmental baseline of the area potentially affected by

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<sup>28</sup> Running water.

<sup>29</sup> See 50 CFR § 402.02 (1999) (definition of “effects of the action”). Action area is defined by the consultation regulations (50 CFR 402.02) as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.”

the proposed action should be used in making the jeopardy determination. Consequently, delineating the action area for the proposed or continuing action is one of the first steps in identifying the environmental baseline. For the lotic environs typical of salmon habitat-related consultations, a watershed or sub-basin geographic unit (and its downstream environs) is usually a logical action area designation. Most habitat effects are carried downstream readily, and many travel upstream as well (e.g., channel downcutting). Moreover, watershed divides provide clear boundaries for analyzing the cumulative effects of multiple independent actions.<sup>30</sup>

C. Determine the Effects of the Action on the Species.

In this step of the analysis, NMFS examines the likely effects of the proposed action on the species and its habitat within the context of its current status and existing environmental baseline. The analysis also includes an analysis of both direct and indirect effects of the action. “Indirect effects” are those that are caused by the action and are later in time but are still reasonably certain to occur. They include effects on species or critical habitat of future activities that are induced by the action subject to consultation and that occur after the action is completed. The analysis also takes into account direct and indirect effects of actions that are interrelated or interdependent with the proposed action. “Interrelated actions” are those that are part of a larger action and depend on the larger action for their justification. “Interdependent actions” are those that have no independent utility apart from the action under consideration.

NMFS may use either or both of two independent techniques in assessing the impact of a proposed action. First, NMFS may consider the impact in terms of how many listed salmon will be killed or injured during a particular life stage and gauge the effects of that take’s effects on population size and viability. Alternatively, NMFS may consider the impact on the species’ freshwater habitat requirements, such as water temperature, substrate composition, dissolved gas levels, structural elements, etc. This second technique is especially useful for habitat-related analyses because, while many cause and effect relationships between habitat quality and population viability are well known,<sup>31</sup> they do not lend themselves to meaningful quantification in terms of fish numbers. Consequently, while this second technique does not directly assess the effects of actions on population condition, it indirectly considers this issue by evaluating existing habitat conditions in light of habitat conditions known to be conducive to salmon conservation.

Though there is more than one valid analytical framework for determining effects, NMFS usually uses a matrix of pathways and indicators to determine whether proposed actions would further damage

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<sup>30</sup> National Research Council, *Upstream: Salmon and Society in the Pacific Northwest*. National Research Council, National Academy Press, Washington, D.C., pp. 34, 213 & 359 (1996).

<sup>31</sup> See Spence et al., *An Ecosystem Approach to Salmonid Conservation*, ManTech Environmental Research Services Corporation, Corvallis, Oregon (1996).



impaired habitat or retard the progress of impaired habitat toward properly functioning condition. For the purpose of guiding Federal action agencies in making effects determinations, NMFS has developed and distributed a document detailing this method.<sup>32</sup> This document is discussed in more detail below. The levels of effects, or effects determinations, are defined<sup>33</sup> as:

**“No effect.”** Literally no effect whatsoever. No probability of any effect. The action is determined to have “no effect” if there are no proposed or listed salmon and no proposed or designated critical habitat in the action area or downstream from it. This effects determination is the responsibility of the action agency to make and does not require NMFS review.

**“May affect, not likely to adversely affect.”** Insignificant, discountable, or beneficial effects. The effect level is determined to be “may affect, not likely to adversely affect” if the proposed action does not have the potential to hinder attainment of relevant properly functioning indicators and has a negligible (extremely low) probability of taking proposed or listed salmon or resulting in the destruction or adverse modification of their habitat. An insignificant effect relates to the size of the impact and should never reach the scale where take occurs.<sup>34</sup> A “discountable effect” is defined as being so extremely unlikely to occur that a reasonable person cannot detect, measure, or evaluate it. This level of effect requires informal consultation, which consists of NMFS concurrence with the action agency’s determination.

**“May affect, likely to adversely affect.”** Some portion or aspect of the action has a greater than insignificant probability of having a detrimental effect upon individual organisms or habitat. Such detrimental effect may be direct or indirect, short- or long-term. The action is “likely to adversely affect” if it has the potential to hinder attainment of relevant properly functioning indicators, or if there is more than a negligible probability of taking proposed or listed salmon or resulting in the destruction or adverse modification of their habitat. This determination would apply when the overall effect of an action has short-term adverse effects even if the overall long-term effect is beneficial. In such instances, NMFS conducts a jeopardy

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<sup>32</sup> See NMFS, *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (MPI) (1996).

<sup>33</sup> These definitions are adapted from those found in NMFS, *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (MPI) (1996), and; U.S. Fish and Wildlife Service and National Marine Fisheries Service., *Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act*. U.S. Government Printing Office, Washington, D.C. (1998)

<sup>34</sup> “Take” means to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct.” 16 USC §1532(19) (1988).

analysis.

The above effects determinations are applicable to individual fish, including fry and embryos. The MPI should be applied at spatial scales appropriate to the proposed action so that its habitat effects on individuals are fully taken into account. For example, if any of the indicators in the MPI are thought to be degraded by the proposed action to the extent that take of an individual fish results, the action is determined to be “may affect, likely to adversely affect.” For actions that are likely to adversely affect, NMFS must conduct a jeopardy analysis and render a biological opinion resulting in one of the conclusions below:

**“Not likely to jeopardize” and/or “Not likely to result in the destruction or adverse modification of critical habitat.”** The action does not appreciably reduce the likelihood of species survival and recovery or result in the destruction or adverse modification of its critical habitat.

**“Likely to jeopardize” and/or “Likely to result in the destruction or adverse modification of critical habitat.”** The action appreciably reduces the likelihood of species survival and recovery or results in the destruction or adverse modification of its critical habitat.

D. Consider Cumulative Effects in the Action Area.

The ESA implementing regulations define “cumulative effects” as those effects caused by future projects and activities unrelated to the action under consideration (not including discretionary Federal actions) that are reasonably certain to occur within the action area.<sup>35</sup> Since all future discretionary Federal actions will at some point be subject to § 7 consultation, their effects will be considered at that time and are not included in cumulative effects analysis.

E. Jeopardy Determinations.

In this step of the analysis, NMFS determines whether (a) the species can be expected to survive, with an adequate potential for recovery, under the effects of the proposed or continuing action, the environmental baseline and any cumulative effects; and (b) whether the action will appreciably diminish the value of critical habitat for both the survival and recovery of the species. In completing this step of the analysis, NMFS determines whether the action under consultation, together with all cumulative effects when added to the environmental baseline, is likely to jeopardize the continued existence of the listed species or result in destruction or adverse modification of critical habitat.

For the jeopardy determination, NMFS uses the consultation regulations and the MPI analysis method

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<sup>35</sup> 50 CFR § 402.02 (1999).

to determine whether actions would further degrade the environmental baseline or hinder attainment of PFC at a spatial scale relevant to the listed ESU. That is, because salmon ESUs typically consist of groups of populations that inhabit geographic areas ranging in size from less than ten to several thousand square miles (depending on the species), the analysis must be applied at a spatial resolution wherein the actual effects of the action upon the species can be determined.

The analysis takes into account the species' status because determining the impact upon a species' status is the essence of the jeopardy determination. Depending upon the specific considerations of the analysis, actions that are found likely to impair currently properly functioning habitat, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat towards PFC at the population or ESU scale will generally be determined likely to jeopardize the continued existence of listed salmon, adversely modify their critical habitat, or both. Specific considerations include whether habitat condition was an important factor for decline in the listing decision, changes in population or habitat conditions since listing, and any new information that has become available.

If NMFS anticipates take of listed salmon incidental to the proposed action, the biological opinion is accompanied by an incidental take statement with reasonable and prudent measures to minimize the impact of such take, and non-discretionary terms and conditions for implementing those measures. Discretionary conservation recommendations may also accompany the biological opinion to assist action agencies further the purposes of habitat and species conservation specified in §§ 7(a)(1) and 7(a)(2).

F. Identify reasonable and prudent alternatives to a proposed or continuing action that is likely to jeopardize the continued existence of the listed species.

If the proposed or continuing action is likely to jeopardize the listed species or destroy or adversely modify critical habitat, NMFS must identify reasonable and prudent alternatives that comply with the requires of § 7(a)(2) and with the applicable regulations. The reasonable and prudent alternative must be consistent with the intended purpose of the action, consistent with the action agency's legal authority and jurisdiction, and technologically and economically feasible. At this stage of the consultation, NMFS will also indicate if it is unable to develop a reasonable and prudent alternative.

#### **IV. Application Tools Useful in Conducting § 7 Analyses - The Matrix**

As previously mentioned, NMFS has developed an analytic methodology to help determine the environmental effects a given action will have by describing an action's effects on PFC.<sup>36</sup> This

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<sup>36</sup> NMFS, *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (MPI) (1996).

document includes a *Matrix of Pathways and Indicators* (MPI; often called “The Matrix,”) and a dichotomous key for making effects determinations based on the condition of the environmental baseline and the likely effects of a given project. The MPI helps the action agency and NMFS describe current freshwater habitat conditions, determine the factors limiting salmon production, and identify sensitive areas and any risks to PFC. This document only *helps* make effects determination, it does not describe jeopardy criteria per se.

The pathways for determining the effects of an action are represented as six conceptual groupings (*e.g.*, water quality, channel condition, and dynamics) of 18 habitat condition indicators (*e.g.*, temperature, width/depth ratio). Default indicator criteria<sup>37</sup> (mostly numeric, though some are narrative) are laid out for three levels of environmental baseline condition: properly functioning, at risk, and not properly functioning. The effects of the action upon each indicator is classified by whether it will restore, maintain, or degrade the indicator.

The MPI provides a consistent, but geographically adaptable, framework for effects determinations. The pathways and indicators, as well as the ranges of their associated criteria, are amenable to alteration through the process of watershed analysis. The MPI, and variations on it, are widely used in § 7 consultations. The MPI is also used in other venues to determine baseline conditions, identify properly functioning condition, and estimate the effects of individual management prescriptions. This assessment tool was developed for forestry activities. NMFS is working to adapt it for other types of land management, and for larger spatial and temporal scales.

For practical purposes, the MPI analysis must sometimes be applied to geographic areas smaller than a watershed or basin due to a proposed action’s scope or geographic distribution. These circumstances necessarily reduce analytic accuracy because the processes essential to aquatic habitats extend continuously upslope and downslope, and may operate quite independently between drainages.<sup>38</sup> Such loss of analytic accuracy should typically be offset by more conservative management practices in order to achieve parity of risk with the watershed approach. Conversely, a watershed approach to habitat conservation provides greater analytic certainty, and hence more flexibility in management practices.

## **V. Conclusion**

The NMFS has followed regulations under §§ 7 and 10 of the ESA to develop an analytical procedure

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<sup>37</sup> The unmodified “matrix” uses ranges of values for indicators that are generally applicable between species and across the geographic distribution of salmon. The indicators can be, and have been, modified for more specific geographic and species applications.

<sup>38</sup> L. B. Leopold, *A View of the River*, Harvard University Press, Cambridge, Massachusetts, chapter 1 (1994).

used to consistently assess whether any proposed action would jeopardize or conserve federally protected species. There is a legacy of a more than a century of profound human alterations to the Pacific coast drainages inhabited by salmon.<sup>39</sup> The analytical tool described as the MPI enables proposed actions to be assessed in light of the species current status, the current conditions, and expected effects of the action. Proposed actions that fail to conserve fish and their habitats as initially proposed can be redesigned to avoid jeopardy and begin to restore watershed processes. Conservation of listed salmon will depend largely on the recovery of watershed processes that furnish their aquatic habitat.

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<sup>39</sup> See Cone and Ridlington, *The Northwest Salmon Crisis, a Documentary History*. Oregon State University Press, Corvallis, Oregon, pp. 12-21 & 154-160 (1996); W. Nehlsen *et al.*, *Pacific Salmon at the Crossroads: Stocks at Risk from California, Oregon, Idaho, and Washington*, Fisheries, Vol.16(2), pp. 4-21 (1991).